

# Clinical Risk Factors for Severe *Clostridium difficile*–associated Disease

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## CME ACTIVITY

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### Learning Objectives

Upon completion of this activity, participants will be able to:

- Identify the criteria used to define severe *Clostridium difficile*–associated disease (CDAD) in the current study
- Specify the prevalence of severe CDAD in the current study
- Identify the clinical risk factors for severe CDAD
- List the laboratory risk factors for severe CDAD

### Editor

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Identifying patients who are at high risk for severe *Clostridium difficile*–associated disease (CDAD) early in the course of their infection may help clinicians improve outcomes. Therefore, we compared clinical features associated with severe versus nonsevere CDAD by retrospectively reviewing records of hospitalized patients whose fecal assays were positive for *C. difficile* toxin. Of 336 patients, 12.2% had severe disease and 10.1% died from all causes. Regression modeling showed the following to be significantly associated with severe CDAD ( $p \leq 0.05$ ): age  $>70$  years (odds ratio [OR] 3.35), maximum leukocyte count  $>20,000$  cells/mL (OR 2.77), minimum albumin level  $<2.5$  g/dL (OR 3.44), maximum creatinine level  $>2$  mg/dL (OR 2.47), small bowel obstruction or ileus (OR 3.06), and computed tomography scan showing colorectal inflammation (OR 13.54). These clinical and laboratory markers for severe disease

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may be useful for identifying patients at risk for serious outcomes or death.

The incidence and severity of *Clostridium difficile*–associated disease (CDAD) is increasing in North America (1–3) and Europe (4,5). During the past 10 years in the United States, prevalence, case-fatality rates, total attributable mortality rates, and colectomy rates for persons with CDAD have markedly increased (6). Acquisition of *C. difficile* and the development of severe CDAD is associated primarily with healthcare, although community-acquired severe disease among persons previously thought to be at low risk for infection have been reported (5,7,8). Several mechanisms for increased disease severity have been proposed, including emergence of specific strains with genetic polymorphisms that encode higher levels of bacterial toxins A and B and the production of a binary toxin (3,9,10). The Centers for Disease Control and Prevention has reported outbreaks of CDAD associated with the new BI/NAP1 strain in 40 of 50 US states, although the association

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### Article Title

### Clinical Risk Factors for Severe *Clostridium difficile*–associated Disease

### CME Questions

**1. All of the following were criteria for severe *Clostridium difficile*–associated disease (CDAD) in the current study, except:**

- A. One or more intensive care unit admissions in which *C. difficile* was a major contributor
- B. Prolonged symptoms past 14 days requiring intravenous fluid replacement
- C. Colectomy or other surgery directly attributed to *C. difficile*
- D. Intestinal perforation in the setting of *C. difficile* infection

**2. What was the prevalence of severe CDAD among all of the cases of CDAD in the current study?**

- A.  $<1\%$
- B.  $12\%$
- C.  $29\%$
- D.  $44\%$

**3. Which of the following patient factors was most associated with an increased risk for severe CDAD on multivariate analysis of the current study?**

- A. Age  $>70$  years
- B. Chemotherapy use
- C. Antimicrobial use
- D. Previous hospital stay

**4. All of the following laboratory factors were predictive of an increased risk for CDAD in the current study, except:**

- A. White blood cell count  $>20,000$  cells/mL
- B. Serum albumin  $<2.5$  g/dL
- C. Creatinine  $>2$  mg/dL
- D. Alanine aminotransferase  $>40$  U/L

### Activity Evaluation

|   |   |   |   |                |
|---|---|---|---|----------------|
| <b>1. The activity supported the learning objectives.</b>                     |   |   |   |                |
| Strongly Disagree   |   |   |   | Strongly Agree |
| 1   | 2 | 3 | 4 | 5              |
| <b>2. The material was organized clearly for learning to occur.</b>           |   |   |   |                |
| Strongly Disagree   |   |   |   | Strongly Agree |
| 1   | 2 | 3 | 4 | 5              |
| <b>3. The content learned from this activity will impact my practice.</b>     |   |   |   |                |
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